Eleven storms were found to have occurred in 1898. Tracks for these storms are presented in Fig.1.

Storm 1, 1898 (Aug. 2-3), H.

The following information was found in relation to this storm: 1) The Florida storm first appeared as a feeble disturbance near Jupiter in the night of Aug.1, and passed thence N.W. to the vicinity of Tampa by the morning of Aug.2. According to A.J. Mitchell, observer and section director, Weather Bureau, Jacksonville, the storm approached the coast in the vicinity of St.Joseph Bay, during the evening of Aug.2. The wind velocity gradually increased from about 8 P.M. Aug.2 and continued until 3 or 4 A.M. Aug.3. Near the coast the maximum wind was felt around 2 A.M. Aug.3, from the S.E. The storm track was about 60 miles wide and embraced mainly the section of country between the Choctawhatchee and Apalachicola Rivers. Throughout this section great damage was done to crops, turpentine farms and other property. Three barges, 4 tug boats, several pile drivers and a number of sailing craft were sunk and wharves and dwelling were damaged. The inland progress of the storm was characterized by diminishing force, and the disturbance was practically dissipated before it reached the Alabama line (Monthly Weather Review, Aug.1898). 2) The heavy rain that began about 10 P.M. Monday night (Aug.1) continuing steadily 24 hours has put the streets in the same condition that was the cause of so much profanity during the raining spell two weeks ago (The Morning Tribune Tampa, Aug.3, 1898, p.4, col.4). 3) It was so rough at Port Tampa yesterday that the steamer "Lawrence" did not venture outside the bay. The Marine Hospital tug "Forter" started to Edmont Key but returned to port. The tide was unusually high (The Morning Tribune, Tampa, Aug.3, 1898,p.4, col.4). 4) G.E. Hardester, of this city, had a narrow escape from death as a result of the storm that raged on Tampa Bay Monday night (Aug.1) and all Tuesday (Aug.2). The pile driver and a lighter were at the scene of the wreck of the schooner "Stanbury" in Tampa Bay. A large portion of the cargo of the schooner has been removed and was loaded on the lighter. The storm came with such force that the lighter was sunk. The pile driver broke adrift loosing 4 anchors. It was driven down the bay by the force of the wind until it struck against beacon No.5 about 22 miles from the city. Mr. Hardester remained on the beacon from midnight Monday night (Aug.1-2) until 12 o'clock yesterday (Aug.3) when he was taken off by schooner "Herrick" which was passing up the bay. The storm was terrific down the bay and great damage was done in many places (The Morning Tribune, Tampa, Aug.4, 1898, pg.1, col.3). 5) A dispatch from Apalachicola, FL. says that the "Nimrod", towing the dredge "Thomas H. Herndon" and two scows were totally wrecked

off Cape San Blas on Tuesday night (Aug.2) storm. The "Nimrod", with a crew of 12 men went down 40 miles at sea. The dredge, with her 2 scows, is ashore at Cape San Blas, the dredge being a total loss, The purser and 2 shipmates of the "Nimrod" arrived at Apalachicola, Friday afternoon (Aug.5) reporting the loss (The Miami Metropolis, Aug.12, 1898,p.7, col.3). 6) Maximum wind velocities: Jupiter, E. 34 mph on Aug.1; Montgomery, N. 28 mph on Aug.3 (Monthly Weather Review, Aug,1898). 7) Storm of Aug.2-3, 1898. Most of the State of Florida. Minimal,12 or more killed (Dunn and Miller, 1960).

Information in the above items was found to support, in general, the track for Storm 1, 1898 which is shown in Neumann et al. (1993). The storm should have existed to the E. of Florida in the morning of Aug.1, because it was first noted at Jupiter in the night of that day (item 1) and a maximum wind velocity of 34 mph was reported there on Aug.1 (item 5). However, such information was insufficient to determine a 7 A.M. Aug.1 position, and, therefore, the track in Neumann et al. (1993) could not be extended eastward. Such a track is reproduced in Fig.1.

Strictly speaking, the author of this study could not verify the hurricane status which Neumann et al. (1993) gave to this storm. However, that status was accepted because the storm description in item 1) suggested hurricane intensity.

Storm 2, 1898 (Aug.30-Sept.1), H.

The following information was found about this storm: 1) During Aug.27 through 29, a feeble disturbance drifted eastward over the Gulf of Mexico, and on the morning of Aug.30 there were premonitory signs of a storm formation off the South Atlantic coast. The regular mornings and special reports of Aug.30 located the point of storm's inception off, and not far distant from the Georgia coast; although these reports did not indicate the hurricane intensity over the very limited area it covered, N.E. storms signals were ordered and storms warnings were telegraphed to South Atlantic ports from Jacksonville to Norfolk and the Chief of Bureau of Navigation (Navy Department) was notified of the threatening conditions during the afternoon of Aug.30, 12 hours before the storm center reached the coast line. The greatest wind velocity, was apparently experienced at Tybee Island where a velocity of 84 mph was recorded about 4:30 A.M. Aug.31. In addition to destruction and damage, heavy losses were caused by torrential rains and floods along the Georgia coast and to river plantations between Augusta and Savannah. The territory ravaged by this storm was confined to Savannah and vicinity, and the report of the observer at that point indicates the general character of the storm. The lowest barometer reading 29.23 inches occurred at 4:30 A.M. Aug.31 indicating that at that time the center of the storm was over the city. At midnight (Aug.30-31) the wind velocity had

risen to 45 mph from the N.W. and the barometer had fallen to 29.73 inches.. At 3:30 A.M. (Aug.31) a terrific wind squall occurred, during which a velocity of 76 mph was recorded for 5 minutes with an extreme velocity (one mile) of 80 mph. From that hour, there was a slow but perceptible decrease in the wind force although heavy gusts and squalls continued, and the barometer fell until 4:30 A.M. At 4:05 A.M. the wind shifted from N.W. to W., to S.E. at 5:40 A.M. and to S. at 8:00 A.M. (Aug.31) with rapidly rising barometer. Great damage was done to roofs, etc., the streets being littered with debris. The damage to shipping was considerable, lighters were blown ashore, dredges went adrift and two barges were stranded on the river front; railroad roadbeds were washed out and telegraph and telephone lines were prostrated, leaving the city without communication. The storm was not severely felt at Charleston and did not extended to Jacksonville (Monthly Weather Review, Aug. 1898). 2) The voluntary observer at Port Royal, S.C., states that on Aug. 30-31 a storm of considerable energy visited the section reaching its height between 4 and 6 A.M. Aug.31. The maximum wind velocity was estimated to be 60 to 70 mph from E. to S.E. The precipitation of 10.82 inches during the 24 hours ending at 8 P.M. Aug.31 exceeded by 5.89 inches any daily precipitations ever recorded (Monthly Weather Review, Aug. 1898). 3) A storm appears to be developing off the South Carolina coast and will probably move up the Atlantic Coast (The New York Times, Aug.31, 1898, p.1, col.2). 4) The storm which developed off the South Carolina coast, Tuesday (Aug.30) has moved to central Georgia, diminishing in intensity, and has caused at Savannah during the past 24 hours 7.32 inches of rain and a N.W. wind of 80 mph (The New York Times, Sept 1, 1898, p.1, col.6.). 5) Atlanta, GA, Sept.3. The storm that has swept over S.E. Georgia for the past 2 days has put 6 counties under water and damaged railroads and telegraphic communication in that part of this state. Eight inches fell at Tennille in 12 hours and the wind reached 60 mph. Atlanta received the touch of the storm today; the wind reached 35 mph and the rain was very heavy (The New York Times, Sept.2, 1898, p.2, col.3). 6) Savannah, Ga. Sept.3. Two more wrecks were reported today off the entrance of Calabogue Sound. Both were dismasted schooners in the storm swept section of the coast. The loss of property is increasing. The first train from the north in 3 days reached here this afternoon, bringing the mail that have been accumulated north of the overflowed territory (The New York Times, Sept.4, 1898, p.10, col.3). 7) Maximum wind velocities were: Charleston, E. 52 mph on Aug.30; Savannah, N.W. 76 mph on Aug.31; Augusta, N.E. 28 mph on Aug.31 (Monthly Weather Review, Aug, 1898) Author's note: In addition, The Monthly Weather Review, Sept.1898 shows that a maximum velocity of 36 mph from the S. occurred at Atlanta on Sept.1. 8) Storm of Aug.31, 1898. Georgia. Minimal. Center over Tybee Island (Dunn and Miller, 1960). 9) Track for this storm showing these positions: Aug.30 (morning) lat. 29.7 N., long. 79.7

W.; Aug. 30 (evening) lat. 31 N., long. 80.3 W.; Aug.31 (morning), lat. 32.5 N., long. 82 W.; Aug.31 (evening), lat. 32 N., long. 83.5. W.; Sept.1 (morning), lat. 33 N., long. 84.5 W.; Sept.1 (evening), lat. 32.7 N., long. 87.5 W. (Monthly Weather Review, Aug. 1898).

Information contained in the above items was found to support, in general, the track for Storm 2, 1898 which is displayed in Neumann et al. (1993). Therefore, the author of this study kept unchanged that track and reproduced it in Fig.1.

The hurricane status which Neumann et al. (1993) gave to this storm was supported by the maximum wind velocities reported at Savannah (items 1 and 7) and by the minimum pressure of 29.23 inches reported at that place (item 1).

Storm 3, 1898 (Sept.3-5), H.

This is a new storm case which has been recently documented by the author of this study. Of course, this case is not included in Neumann et al. (1993).

Documentation of this case was based on the following information: 1) Boston, Sept.14. Ship "America" left Quebec for Greenock (Scotland) on Aug. 19. On Sept.3. a gale from the E. sprung up and by night was blowing a hurricane. Under heavy seas, the ship began to strain and afterward sprung a leak. By noon Sept.4. the ship was waterlogged and a wreck. Just before dark the "Marengo" had it in sight and, in a difficult operation owing to heavy seas, the crew was picked up by the steamer and brought to Boston. The rescue occurred at lat. 48 51 N., long. 34 22 W. (The New York Times, Sept.15, 1898, p.1, col.6). 2) Ship "Mexican" at Liverpool from New Orleans, reported spoke barque "Ruthin" on Sept.9. The "Ruthin" reported that on Sept.4 in lat. 45 N., long. 38 W. encountered a hurricane and had to cut away fore and maintop masts to save the ship (The Times London, Sept.15, 1898, p.4., col.5). 3) Brig "Iddesleigh" encountered hurricane on Sept.5 in lat. 48 N., long. 31 W. (The Times London, Sept.21, 1898, p.4, col.5).

On the basis of the information in the above items, the author of this study produced an approximate track for Storm 3, 1898. The confidence he has in such a track is rather low because no wind or pressure information was available at specific times in the above items and only the day or a portion of the day the ships encountered a gale or a hurricane were given. Therefore, 7 A.M. position errors may be large, particularly along the S.W. to N.E. direction which the storm apparently followed. After a careful analysis of the combined information in items 1) through 3), the author's best estimates for 7 A.M. positions were as follows: Sept.3, near 42.0 degrees N., 41.0 degrees W.; Sept.4, near 46.0 degrees N., 35.5 degrees W.; Sept.5, near 49.5 degrees N., 30.0 degrees W. The author's track for Storm 3, 1898 is displayed in

Fig.1. Such a track is very likely to be a partial one, since indications are that the storm should have existed in the middle of the Atlantic Ocean for sometime prior to its detection on Sept.3 (item 1).

Taking into account that the storm was characterized as a hurricane in items 1) through 3), the author of this study decided to give a hurricane status to this storm. It is possible, however, that the storm would have been in the process of transforming itself into an extratropical system towards the end of the period Sept.3-5.

Storm 4, 1898 (Sept.5-20), H.

This storm corresponds to Storm 3, 1898 in Neumann et al. (1998).

Quite abundant information was found in relation to this storm: 1) Barque "Tourny", sailing from Calcutta. Midday Sept.9, lat. 12 02 N., long. 54 02 W. from Paris, ran into a hurricane. Strong wind blowing from N.E., with heavy swell. Barometer 29.60 inches. Wind increasing in force after midday, and barometer falling one-tenth inch per hour from 4 P.M., reaching 29.10 inches at 7 P.M. Wind during that time changing from N.E. to N.N.E. with heavy rain squalls. At 7 P.M. bright lighting in the S.W., barometer rising, reaching 29.50 inches at about midnight, and wind went to S.W. blowing exceedingly strong. At 11 P.M., relative calm, but tremendous seas. On Sept.10, about 350 miles E. of Barbados, 7 A.M, the barometer read 29.70 inches. Calm until midday, wind afterwards going to N.E. From Sept.10 to Sept.12 vessel driven 60 miles northward out of her course. Strong current during that time moving towards the N.W. On Sept.13, it was observed that another current, but not so strong, was moving toward the N.W. The vessel lost all sails and her cargo of rice was nearly a total loss. The vessel reached Barbados on Sept.15. While on board the vessel an examination was made of the captain's barometer and it was found to read about 0.25 inch too low. (Monthly Weather Review, Sept.1898). Author's note: The above information was extracted from a report of Mr. Donough, U.S. Weather Bureau observer. To convert the longitude to the Greenwich meridian about 2 degrees would have to be subtracted. However, the longitude as given fits better a space-time continuity along the track, and, therefore, it is suspected that it might have already referred to Greenwich instead of to Paris as stated. 2) On Sept.10, regular morning reports, supplemented by a special report cabled at 12:40 P.M. by the U.S. Weather Bureau observer at Bridgetown, Barbados showed the presence of a cyclonic disturbance S.E. of the Windward Islands. Warning were immediately cabled to Weather Bureau stations in the Lesser Antilles informing that the hurricane would move from a point S.E. of Barbados slowly northwestward with increasing force. Other advisory messages were sent to the islands as far west as Jamaica

and eastern Cuba, and to points of the South American coast of the Caribbean Sea, and also to Admiral Watson's feet lying in the harbor of Caimanera, Cuba. (Monthly Weather Review, Sept,1898). 3) A storm of considerable intensity appears to be developing in the eastern Caribbean Sea near Barbados (The New York Times, Sept.11, 1898, p.1, col.6). Author's note: The above statement was probably issued the evening before its publication date. 4) Selected observations taken at Barbados: Oct.10, noon, barometer 29.87 inches, wind N.E.; 3 P.M., barometer 29.76 inches, wind N. 9 mph; 6 P.M., barometer 29.70 inches, wind N. 17 mph; 7 P.M., barometer 29.58 inches, wind N.E. 31 mph; 8 P.M., barometer 29.55 inches, wind N.E. 36 mph; 9 P.M., barometer 29.47 inches, wind N.E. 43 mph; 10 P.M., barometer 29.49 inches, wind N.E. 54 mph; 11 P.M., barometer 29.55 inches; midnight (Sept.10-11), barometer 29.59 inches; 1 A.M. Sept.11, barometer 29.65 inches; 2 A.M., barometer 29.68 inches; 3 A.M., barometer 29.71 inches; 4 A.M., barometer 29.74 inches; 5 A.M., barometer 29.77 inches; 8 A.M., barometer 29.85 inches. Lowest barometer was 29.46 inches at 9:20 P.M. Sept.10, after which it rose rapidly. The greatest velocity for 5 minutes was N.E. 62 mph at 10:01 P.M., and the greatest for 1 minute was 75 mph at 10:18 P.M. when the apparatus was blown down. The wind changed to the N. about 11 P.M. and it is my belief that it attained a much greater velocity between 11 P.M. and midnight than at any other time. It abated some after midnight, but a strong gale was maintained up to the observation in the morning of Sept.11 (Monthly Weather Review, Sept.1898). Author's note: The above information was extracted from the report of Mr. P. Mc Donough, the Weather Bureau observer at Barbados. 5) Some observations taken at the Botanic Gardens, Kingstown, St. Vincent. Barometer readings were corrected for index error, elevation and temperature. On Sept.10, 3 P.M., 29.84 inches; Sept.11, 5:55 A.M., 29.72 inches; 9 A.M., 29.61 inches; 10 A.M., 29.54 inches; 10:30 A.M., 29.41 inches; 10:55 A.M., 29.12 inches; 11:10 A.M., 28.82 inches; 11:20 A.M., 28.72 inches; 11:25 A.M., 28.67 inches; 11:35 A.M., 28.52 inches; 11:40 A.M., 28.51 inches; barometer remained at 28.51 inches from 11:40 A.M. to 12:30 P.M. and then commenced to rise slowly and afterwards rose almost as rapidly as it had previously fallen; 3 P.M., 29.53 inches, 7 P.M., 29.77 inches. The wind at 5:55 A.M. was blowing in short but fitful gusts from N. and N.W.; at 9 A.M., the wind was rushing between N. and N.W. The first part of the storm lasted from 10 A.M. to 11:40 A.M. The wind still continued blowing from N., N.W. and W. and increased in such force at 11 A.M. that the largest trees were uprooted. The velocity of the wind during the first part of the storm from 11 to 11:40 A.M., was from 55 to 60 mph. At 11:40 A.M. there was a lull and almost a dead calm for about three quarters of an hour. At about 12:25 P.M. the wind suddenly began to blow from the S. and increased in force every minute, blowing occasionally from S.S.W. Between 1 and 2 P.M. the storm reached its highest point, the velocity of the wind far

exceeding that of the forenoon; it was then fully 90 to 100 mph. This continued until about 2:20 P.M., when the wind slackened considerably (Monthly Weather Review, Sept.1898). 6) A storm is apparently developing to the S.W. of St. Kitts. Martinique reports barometer reading of 29.78 inches, heavy S. swell, highest water in years. Warnings have been sent to the islands in the vicinity of the storm (The New York Times, Sept.12, 1898, p.1, col.6). Author's note: The above statement was probably issued in the evening of Sept.11. 7) In reference to the island of St. Kitts, the hurricane of Sept.12, 1898 passed the island with only a slight brush, causing no damage (Alexander, 1902). Author's note: A similar statement was published in the Monthly Weather Review, Sept.1898). 8) The maximum wind velocity at Basseterre, St. Kitts, was S. 54 mph and occurred on Sept.12. Other maximum wind velocities for Sept.1898 were: Bridgetown, Barbados N.E. 62 mph on Sept.10; Wellenstand, Curacao, S. 28 mph on Sept.12 (Monthly Weather Review, Sept.1898). 9) After Sept.11 this storm lost strength rapidly, and there is no evidences at hand to show that during its subsequent northwestern course over the eastern Caribbean Sea and the ocean to the northward it exhibited destructive violence (Monthly Weather Review, Sept.1898). 10) After Sept.11 the hurricane center moved northwestward with a very marked loss of strength, and, finally disappeared east of the Bahamas during Sept.14 (Garriott, 1898). 11) St. Thomas, Sept.12. The latest advices from Barbados received late on Saturday (Sept.10) indicated an approaching hurricane. Yesterday, the storm was passing over St. Lucia but small damage has been done there. All of the islands have experienced boisterous weather, but the storm has passed to the S. of St. Thomas (The New York Times, Sept.13, 1898, p.3, col.5). Author's note: On the basis of information in item 1), the storm should not have passed directly over St. Lucia, but to the W. of that island. In addition, the information that the storm had passed to the S. of St. Thomas does not seem to be supported by the next item. 12) St. Thomas, Sept.14. According to the latest reports from St. Lucia, the storm which broke up upon the island Sunday night (Sept.11) developed almost unprecedented violence. Guadeloupe and the Leeward Group has experienced very heavy weather. A boat from St. Vincent arrived today at Grenada and reported that Kingstown, the capital of St. Vincent is totally destroyed. It is estimated that 300 lives have been lost in that island and that 20,000 people are homeless (The New York Times, Sept.15, 1898, p.1, col.3.). Author's note: The fact that this dispatch does not mention heavy weather at St. Thomas suggests that the storm core passed to the east of that island, having affected the Leeward Islands as indicated. 13) Kingston, Jamaica, Sept.15. The American Weather Bureau here indicates the storm as passing St. Kitts and moving northward (The New York Times, Sept.16, 1898, p.1, col.4). 14) The hurricane swept along the island chain from Barbados westward to St. Vincent and thence to N.W. to St. Kitts, where it was last heard from (The New

York Times, Sept.17, 1898, p.5, col.2). 15) Washington Sept.15. The following is part of a statement by the Weather Bureau: At 8 A.M. Saturday (Sept.10) observations from Martinique and Trinidad gave a slight indication of a disturbance to the S.E. of the Windward Islands. At 12:30 P.M. a special observation from Barbados indicated a fall of nearly one-tenth of an inch in 2 hours and this movement of the barometer satisfied the forecast officer that the hurricane would soon develop over the Windward Islands, although to the non-expert there was no indication of the coming storm. Hurricane warnings were immediately dispatched to Barbados, Martinique, St. Kitts and St. Thomas and advisory messages were sent to Colon, Curacao, Santo Domingo, Trinidad and Santiago (de Cuba). A message was also sent to Admiral Watson's fleet in the harbor of Caimanera, Cuba. The Chief of the Weather Bureau today reports that the hurricane has passed over the eastern portion of the West Indies and is now probably central somewhere off the Bahamas (The New York Times, Sept.16, 1898, p.2, col.4). Author's note: Additional details about the forecasting procedure of this storm were published in the Monthly Weather Review quoting from The Daily Gleaner, Kingston, Jamaica, Sept.16, 1898. The newspaper stated that among the most notable features attending the hurricane was the action of the United States Weather Bureau Station at Half Way Tree which had been established at Kingston, Jamaica a few weeks early for covering the meteorological observation of the West Indies more effectively than heretofore. From the data which, with more or less regularity, have been coming to hand, Mr. Stockman (the Weather Bureau forecast official) on Saturday night (Oct.10) cabled hurricane warnings to Barbados, Martinique, St. Kitts and St. Thomas. The message prognosticated a hurricane immediately, the central portion of which was S. of Barbados, that its direction was towards the N.N.W., and that it was increasing. According to the Gleaner, everyone of these details has been substantiated and, fortunately, the warning was not required for the two more northerly of the islands notified; the hurricane abating its force somewhere in the region of St. Kitts.
16) Philadelphia, Oct. 16. The hurricane which swept the Windward Islands Saturday night (Sept.10) was encountered by the steamship "Avona", which arrived here yesterday, on Sunday morning (Sept.11). The captain believes that many vessels foundered and will be never heard from. (The New York Times, Sept.17, 1898, p.5, col.2). 17) Grenada Sept.14. Authentic news have been received by boat of the results of a hurricane which occurred on Sunday (Sept.11). The damage done is appalling. In St. Vincent all the habitations are leveled and the crops are utterly destroyed. The damage at St. Lucia is less extent. Barbados must have suffered perhaps, most severely (The Times, London, Sept.16, 1898,p.3, cols. 3 and 4).
18) Lloyd's agent at Barbados cables: A hurricane has passed over here doing considerable damage to property and life (The Times, London, Sept.16, 1898, p.3, cols. 3 and 4). 19) The Governor of

Barbados telegraphs to the Colonial Office that latest accounts are dreadful. Ten thousand huts damaged or destroyed. About 50.000 homeless (The Times, London, Sept.17, 1898, p.5, col.4). 20) A telegram from the Governor of Barbados indicates, so far, 83 deaths and many injuries, widespread damage and consequent distress (The Times, London, Sept.20, 1898, p.3, col.3). 21) London, Sept.15. The Governor of Barbados reports that the hurricane was of 10 hours duration. The Governor of the Windward Islands reports that 2 vessels were sunk and that the fate of many others is unknown. (The New York Times, Sept.16, 1898, p.2, col.4). Author's note: The New York Times, Sept. 15, 1898, p.1, col.3, had previously published that 200 persons were killed and 40,000 were rendered homeless by this hurricane. 22) Trinidad B.W.I., Sept.15. A steamer arrived here from Barbados and reported that fearful havoc was caused there by the hurricane on Saturday night (Sept.10). Four vessels broke from their anchorage and were driven to sea. Bridgetown is the scene of desolation and ruin. (The New York Times, Sept.16, 1898, p.2, col.4). Author's note: According to the report by Mr. P. Mc Donough, U.S. Weather Bureau observer at Barbados, which is published in the Monthly Weather Review, Sept. 1898, the number of vessels which were blown out to sea was larger than 4. Ship "Loando", bark "Lapland" and barkentine "Grace Lynwood", which were anchored in the bay and with extra anchors out, were driven before the wind and totally wrecked on the reefs of St. Vincent, about 100 miles to the westward, being this crew saved. A large number of shore boats and lighters were driven out to sea and swamped. Barkentine "Loudahl", local vessels "Kate Florence", "Florence. B. Parr", Government water boat "Florence", stream crane and dredger all were driven out to sea and have not been heard from. 23) Port of Spain, Sept.15. The captains of various crafts at Barbados were warned (about the storm) and H.M.S. "Alert", which was at Carlisle Bay, weighed anchor and steamed out at 6:30 P.M. for safety. But the bulk of citizens at Bridgetown and the residents in the country parishes were entirely unprepared for the storm when it burst at 7:30 P.M. The velocity of the wind for 5 minutes was 62 mph but for one minute the velocity reached 75 mph. Information from Guadeloupe indicates 18 lives lost. The sloop "Marie Stella", from Point-a-Pitre for Goyave, capsized off Goyave and 9 persons were drowned. A landslide occurred at Trois Rivieres, burying 2 homes in one of which were 9 persons (The Times, London, Sept.30, 1898, p.8, col.6). Author's note: The anemometer was blown down at Barbados (item 4) and the U.S. Weather Bureau observer there estimated much higher winds than the ones mentioned in this item. 24) Kingston, Jamaica, via New York, Sept.23. Mail advices just at hand confirm the estimate of 300 lives lost in St. Vincent, apart from the numerous shipping disasters that occurred. St. Lucia suffered mostly by rain and landslip which it caused. The deluge lasted 10 hours. In Barbados, Bridgetown was partially destroyed and St. Michael and Belleville were totally demolished; three quarters of

the inhabitants were left homeless and over 100 lost their lives (The Times, London, Sept.24, 1898, p.5, col.2). 25) The greatest lost of life occurred at Kingstown, St. Vincent, where it is reported that 300 persons have perished. Guadeloupe suffered equally (The Times, London, Sept.16, 1898, p.3, cols.3 and 4). 26) Grenadines got off with little damage, except Bequia, which suffered severely (The Times, London, Sept.27, 1898, p.3, col.5). Author's note: Bequia is the northernmost of the Grenadines and is located just a few miles S. of St. Vincent. 27) Telegram sent by the Secretary of Colonies: "Her Majesty has heard with much regret the news of the serious disaster and loss of life and property in the West Indies and the Queen commands me to express her sincere sympathy with the sufferers" (The Times, London, Sept.19, p.4, col.5). 28) A series of daily observations taken at Port-au-Prince, Haiti by Prof. T. Scherer at noon Greenwich time (7:12 A.M. local time) showed a minimum pressure reading of 29.84 inches (reduced to sea level) on Sept.15. A few cumulus clouds observed the previous day (Sept.14) were coming from a W.N.W. direction (Monthly Weather Review, Oct, 1898). Author's note: The cumulus movement on Sept.14 suggests the cyclone to have been roughly to the N.N.E. of Port-au-Prince on that day. 29) At Havana, the maximum pressure associated with the cyclone of Sept.10-15 was 755.5 millimeters (29.74 inches) and occurred on Sept.15 (Sarasola, 1928). Author's note: The lower pressure value at Havana than at Port-au-Prince (item 28) on Sept.15 suggested that the storm was closer to Havana than to Port-an-Prince on that date. However, the catalog of Cuban cyclones by M. Gutierrez. Lanza, which is included in Sarasola (1928), does not show any storm as having affected Cuba around Sept.15, 1898. 30) Extract from an editorial which appeared in the New Orleans Times-Democrat, Sept.24, 1898: "The hurricane was very severe among the smaller Antilles, and wasted most of its forces before it reached Cuba. All we caught of it was a violent rainstorm. But although it was not as widespread as some other Gulf hurricanes, it was as severe in its intensity where it did rage (Monthly Weather Review, Sept.1898). Author's note: The alleged linkage the storm in Louisiana with the hurricane in the small Antillas is questionable. The storm which affected Louisiana was most likely Storm 5, 1898. 31) Para (Brazil) Sept.29, Ship "Fluminense" has arrived here from New York damaged about the decks during a hurricane on Sept.18 (The Times, London, Sept.30, 1898, p.8, col.3). Author's note: The "Fluminense" was scheduled to sail from New York to Barbados, etc at 3 P.M. Sept.15 (The New York Times, Sept.15, 1898, p.3, col.6); therefore, the Ship should have encountered the hurricane somewhere between Hatteras and Bermuda on Sept.18. 32) Ship "Osorno" has arrived at New York from Bordeaux. She ran into a storm on Sept.19 at lat. 41 21 N., long. 45 05 W. The wind came from S.S.W. and sails have being reduced to storm canvas but the latter ones were reduced to ribbons and the ship was hove over her beam ends. The gale lasted 24 hours. The vessel lay at an angle of 80 degrees. For

11 days the crew worked in the hold seeking to right the ship. While the storm was at its height a crew member was washed overboard and drowned (The New York Times, Oct. 29, 1898, p.7, col.3). Author's note: The longitude given appears to be too far east and might be in error. 33) Storm of Sept. 5-20, 1898. Windward Islands, Atlantic (Tannehill, 1938). 34) Map showing a track for the storm as follows: Sept.10. (morning), lat. 13 N., long. 57.5 W.; Sept.11 (morning), lat. 13 N., long. 60.5 W.; Sept.12 (morning), lat. 15.5 N., long. 64.7 W.; Sept. 13 (morning), lat. 19.7 N., long. 69.7 W.; Sept.14, (morning), lat. 24.5 N., long. 74 W. (Monthly Weather Review, Sept.1898). Author's note: This track and a similar one which is also shown on a second map published in the Monthly Weather Review, Sept.1898, brought the storm center a short distance to the S.W. of Puerto Rico in the evening of Sept.12 and then across the easternmost portion of the Dominican Republic and almost over its N.E. coast early on Sept.13. Such a path is suspected to be erroneous because Salivia (1972) and Garcia-Bonnelly (1958) do not mention any storm to have affected Puerto Rico and the Dominican Republic, respectively, in 1898. 35) A Sept.1898 storm appeared near lat. 13 N. long. 57 W., recurved near lat. 25 N., long. 74 W. and disappeared near Bermuda. Map showing a track as follows: Sept.10 (morning), near lat. 13.3 N., long. 58 W.; Sept.10 (evening), near lat. 13.3 N., long. 59 W.; Sept.11 (morning), near lat. 13.5 N., long.. 60.3 W.; Sept.11 (evening), near lat. 14 N., long. 62.5 W.; Sept.12 (morning), near lat. 16 N., long. 64.3 W.; Sept.12 (evening), near lat. 17.5 N., long. 67.5 W.; Sept.13 (morning), near lat. 20 N., long. 69.7 W.; Sept. 13 (evening), near lat. 22.5 N., long. 73 W.; Sept.14 (morning), near lat. 25 N., long. 74.3 W. (Garriott, 1900). Author's note: This track was ended near lat. 27 N., long. 74 W. and did not brig the storm to near Bernuda, where the text in Garriott (1900) indicated it disappeared. According to this track, the storm center passed over the northern tip of Barbados, over St. Lucia, and the easternmost portion of the Dominican Republic. In general, this track was found to be quite similar to the two ones shown in the Monthly Weather Review, Sept. 1898 (item 34). Therefore, the storm track near Puerto Rico and over the Dominican Republic is suspected to be an error for the same reasons discussed in the above item. In addition, the statement that the storm disappeared near Bermuda should be in error because Tucker (1982) does not mention any storm as having affected that place in 1898. 36) A storm was first observed at lat. 11 N., long. 28 W. on Sept.5, 1898 and lasted 15 days; it recurved at lat. 30 N., long. 70 W. and it was last observed at lat. 52 N., long. 55 W. (Mitchell, 1924). Author's note: A track which is also included in Mitchell (1924) was found to be quite similar to the one shown in Neumann et al. (1993) as far Storm 3, 1893. As a significant difference from the tracks referred to in items 34) and 35), Mitchell (1924) and Neumann et al. (1993) brought the storm center well to the east of Puerto

Rico, which is in line with information in items 7) through 9) and 12) through 15).

The maximum wind from the S. at 28 mph which was recorded on Sept.12 at Curacao (item 8), the occurrence of minimum pressures at Port-au-Prince and Havana on Sept.15 (items 28 and 29) and the content of an editorial published in the New Orleans Times-Democrat (item 30) motivated the author of this study to investigate the possibility that Storm 4, 1898 might have continued westward after passing over St. Vincent on Sept.11, being the same one which the author has identified as Storm 5, 1898 in the western Caribbean Sea (Storm 4, 1898 in Neumann et al. 1993). However, information in a good number of the 36 items above was not found to support that possibility which was then discarded. The northwestward tracks which showed the storm to have moved near Puerto Rico and over the easternmost portion of the Dominican Republic (items 34 and 35) were discarded next on the ground that Salivia (1972) and Garcia-Bonnelly (1958) do not mention any storm having affected those islands in 1898 and, above all, information in items 7) through 9) and 12) through 15) was found to support, in general, the northward track over the eastern Caribbean Sea which is displayed in Neumann et al. (1993) as for Storm 3, 1898. In spite of this, some minor modifications along the above mentioned track were introduced by the author of this study for the period Sept 9-12, 1898. These modifications were aimed at satisfying important information included in other items and were applied not only when the storm was over or near the islands of the eastern Caribbean Sea, but also when it was near Barbados and a few hundred miles to the east. After having kept uncharged the 7 A.M. positions in Neumann et al. (1993) for the period Sept.5-8, owing to the lack of marine data to check them, the author of this study estimated a 7 A.M. Sept.9 position near 12.0 degrees N., 51.5 degrees W. on the basis of information given by the "Tourny" in item 1) and on space-time continuity; this position was about 120 miles to the E. of the one in Neumann et al. (1993). The author's 7 A.M. Sept.10 position was estimated near 12.3 degrees N., 57.0 degrees W. and was primarily based on space-time continuity which was applied backwards in time by using meteorological information taken at Barbados (item 4); this position was about 50 miles to the east of the corresponding one in Neumann et al. (1993). The author's 7 A.M. Sept.11 position was estimated near 13.0 degrees N., 60.7 degrees W. on the basis of meteorological information for St. Vincent (item 5) and space-time continuity; this position was found to be about 175 miles to the S.E. of the one displayed in Neumann et al. (1993). The author's 7 A.M. Sept.12 position was estimated near 17.0 degrees N., 63.3 degrees W. on the basis of information for Martinique (item 6) and St. Kitts (items 7 and 8) and space-time continuity along a smooth track between the author's 7 A.M. Sept.11 position and the 7 A.M. Sept.13 position in Neumann et al. (1993) which was kept unchanged. The author's 7 A.M. Sept.12 position was found to be about 100

miles to the south of the corresponding one in Neumann et al. (1993). 7 A.M. positions for the period Sept 13-17 in the above mentioned publication were kept unchanged because the author of this study could not check them owing to the lack of suitable marine data in the above items. In spite of that, in the author's opinion, the 7 A.M. Sept.18 position in Neumann et al. (1993) was close enough to Bermuda as to have affected that island, but the failure of Tucker (1982) in mentioning the storm there seemed to indicate that this was not the case. In fact, their position for that day was kept unchanged just because the author was unable to produce a better position than theirs by using the vague information given by the "Fluminense" (item 31). Finally, the 7 A.M. Sept.19-20 positions in Neumann et al. (1993) were kept unchanged as information provided by the "Osorno" (item 32) seemed to partially support these positions. The author's track for Storm 4, 1898 is shown in Fig.1.

Information contained in a good number of the 36 items above was found to support the hurricane status that Neumann et al. (1993) gave to this storm (Storm 3, 1898 in their publication). The minimum pressure of 28.51 inches reported at Kingstown, St. Vincent in the eye of the storm around midday Sept.11 (item 5) clearly indicates that Storm 4, 1898 was very close to become a major hurricane at that time.

Storm 5, 1898 (Sept.12-22), T. S.

This is the same storm which Neumann et al. (1993) identify as Storm 4, 1898.

The following information was found about this storm: 1) A storm appears to be developing in the western Gulf (The New York Times, Sept.19, 1898, p.1, col.4). Author's note: This and subsequent statements published in The New York Times were probably issued on the evening before their publication date. 2) A storm is developing in the West Gulf and has caused rains in Texas and in the lower Mississippi Valley (The New York Times, Sept.20, 1898, p.1, col.2). 3) The storm in the West Gulf has moved to Southern Louisiana and caused easterly gales in the Central and East Gulf States. Vicksburg reports a rainfall of 2.58 inches in 12 hours and an E. wind of 32 mph (The New York Times, Sept.21, 1898, p.1, col.6). 4) The storm has moved from Louisiana to Missouri and has caused rain in the Gulf and South Atlantic States and the Middle Mississippi Valley (The New York Times, Sept.22, 1898, p.1, col.6). 5) The storm central Wednesday night (Sept.21) in Missouri has moved to Lake Michigan and has caused rain from the Mississippi Valley to the Atlantic coast (The New York Times, Sept.23, 1898, p.1, col.5). 6) The storm has moved from Lake Michigan to the New England coast (The New York Times, Sept.24, 1898, p.1, col.6). 7) N.E. to E. gales has been experienced in New England. Block Island reports N.E. wind of 56 mph (The New York Times, Sept.25, 1898,

p.1, col.4). 8) Some maximum wind velocities were: Corpus Christi, N.E. 34 mph on Sept.18; Galveston, N.E. 26 mph on Sept.19; New Orleans, S.E. 42 mph on Sept.20; Shreveport, N.E. 26 mph on Sept.20; Mobile, S. 26 mph on Sept.21 (Monthly Weather Review, Sept. 1898). 9) Storm of Sept.20, 1898. Louisiana. Minimal (Dunn and Miller, 1960). 10) Storm of Sept 12-25, 1898. Yucatan, Louisiana (Tannehill, 1938). 11) Track for this storm as follows: Sept.17 (evening), lat. 26 N. long. 98 W.; Sept.18 (morning) lat. 27 N., long. 97.5 W.; Sept.18 (evening), lat. 27 N., long. 96.5 W.; Sept.19 (morning), lat. 28 N.,long. 96 W.; Sept.19 (evening), lat. 28.7 N., long. 94.7 W.; Sept.20 (morning), lat. 29.3 N., long. 93.7 W.; Sept.20 (evening), lat. 31.3 N., long. 93 W.; Sept.21 (morning), 33.5 N., 92.5 W.; Sept.21 (evening), lat. 37.5 N., long. 94.3 W.; Sept.22 (morning), lat. 41 N., long. 92.3 W.; Sept.22 (evening), lat. 43 N., long. 87.5 W.; Sept.23 (morning), lat. 45 N., long. 82.5 W.; Sept.23 (evening), lat. 43.5 N., long. 77 W.; Sept.24 (morning), lat. 41 N., long. 68.7 W. (Monthly Weather Review, Sept, 1898). 12) A storm was first observed at lat. 13 N., long. 80 W. on Sept.12, 1898 and lasted 13 days; it recurved at lat. 24 N., long. 94 W. and it was last observed at lat. 40 N., long.55 W. (Mitchell, 1924). Author's note: A portion of a track which is also shown in Mitchell (1924) was found to be quite similar to the one in Neumann et al. (1993).

Information in most items above was found to support, in general, the track in Neumann et al. (1993) for the period Sept 18-22. Prior to Sept. 18, no information was available in the above items to check the validity of such a track. A possible connection of Storm 5, 1898 with Storm 4, 1898, which entered the eastern Caribbean Sea as far south as St. Vincent on Sept.11, was considered while studying the latter storm, but it was concluded that although there were some very weak clues that this might have been the case, most indications favored a northward motion of that storm towards the area near St. Kitts on Sept.12 and no linkage between the two storms. Finally, information in items 6), 7), 11) and 12) was found to suggest an extension of the track in Neumann et al. (1993) beyond Sept.22; however, this was not done because the author of this study felt that it was likely that any track extension would have probably involve some reorganization of the original tropical storm circulation into an extratropical system over the continent and not a pure translation. The entire track for Storm 4, 1898 in Neumann et al. (1993) was then reproduced in Fig.1 as for Storm 5, 1898.

The tropical storm status which Neumann et al. (1993) gave to this storm was supported by the maximum wind velocity of 42 mph recorded at New Orleans on Sept.20 (item 8).

Storm 6, 1898 (Sept 20-28), T.S.

The following information was found about this storm: 1) A

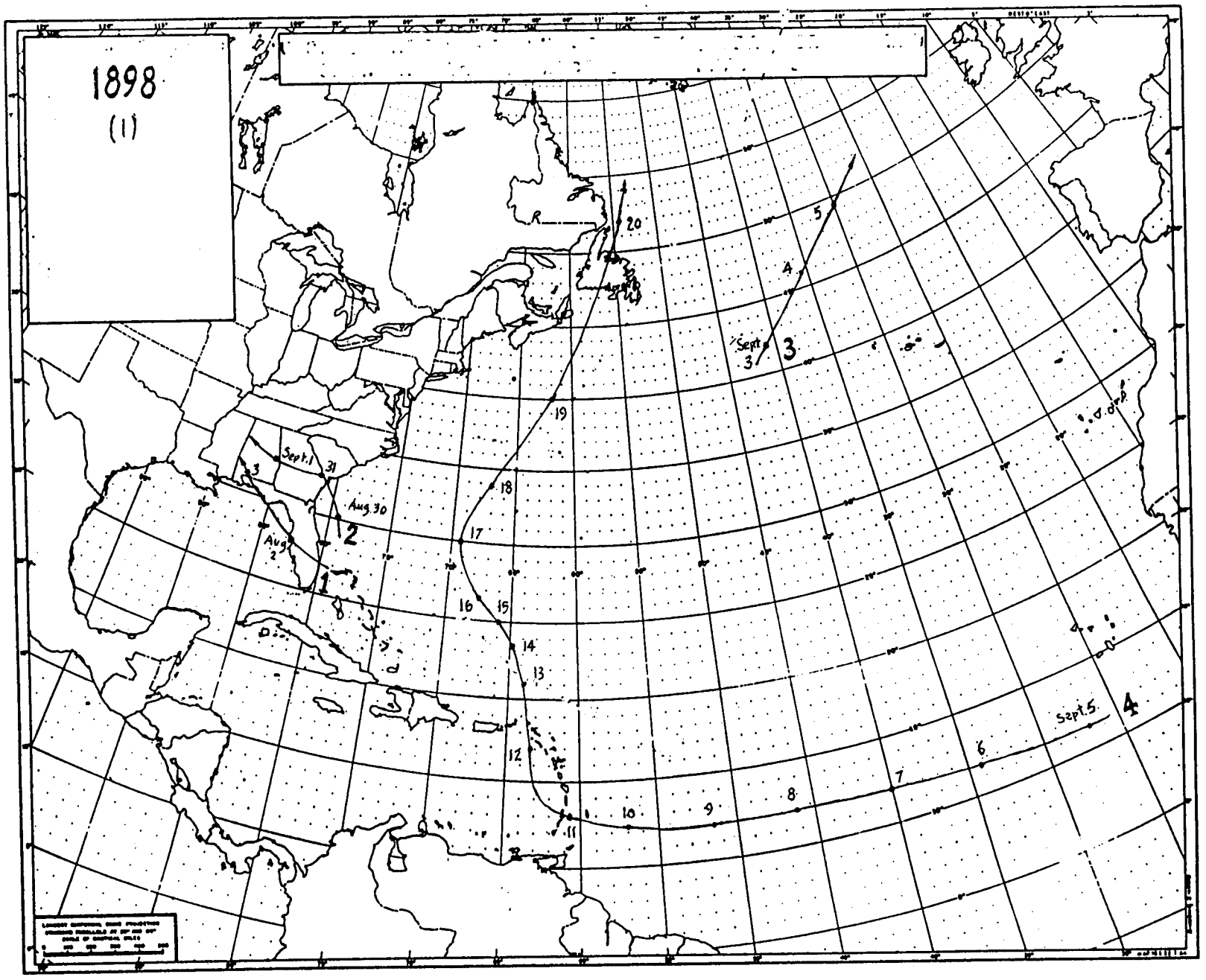
1898
(1)
Sept.1
Aug.30
Aug.2
Sept.3
Sept.5
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Fig.1

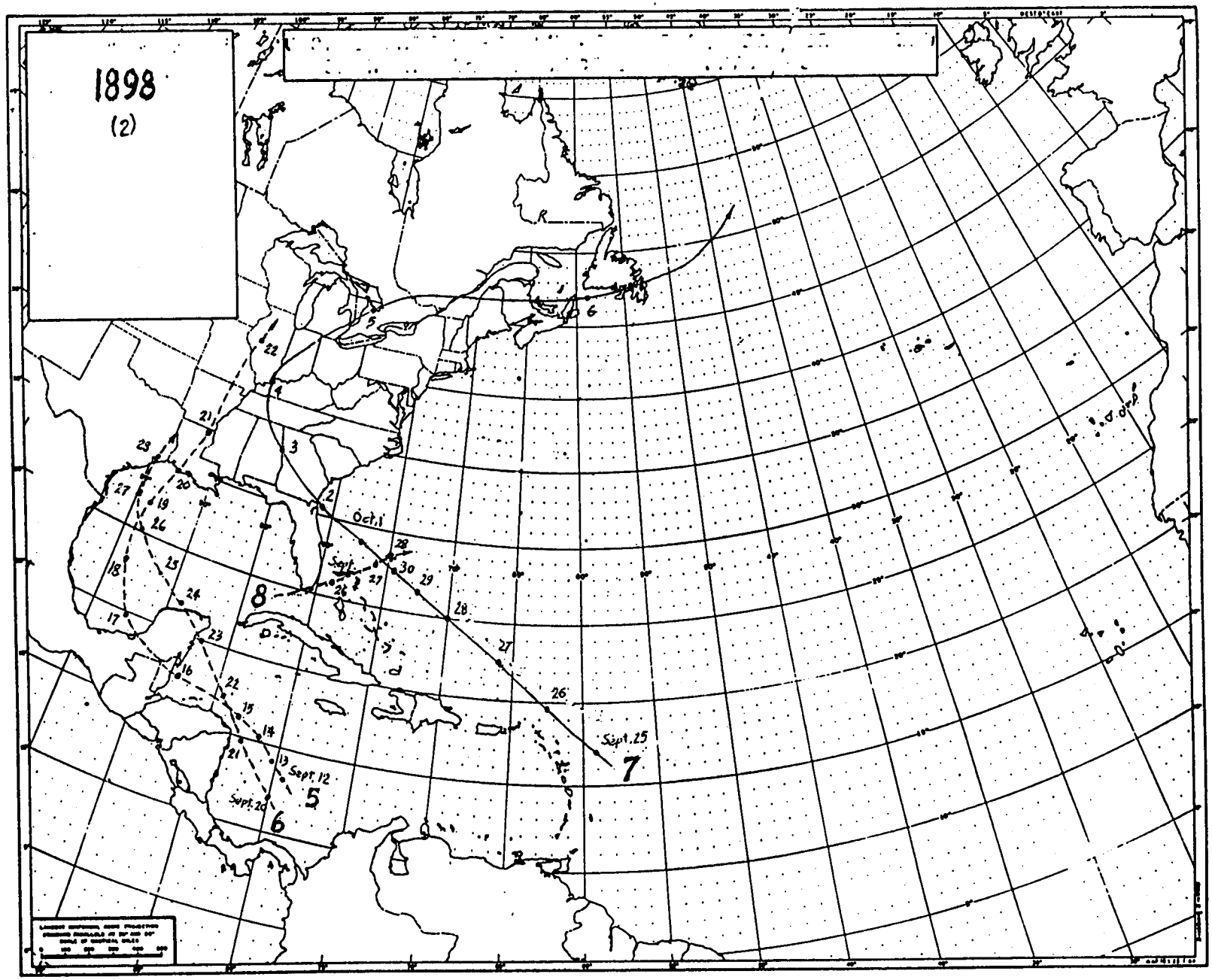

Fig.1 (continued)

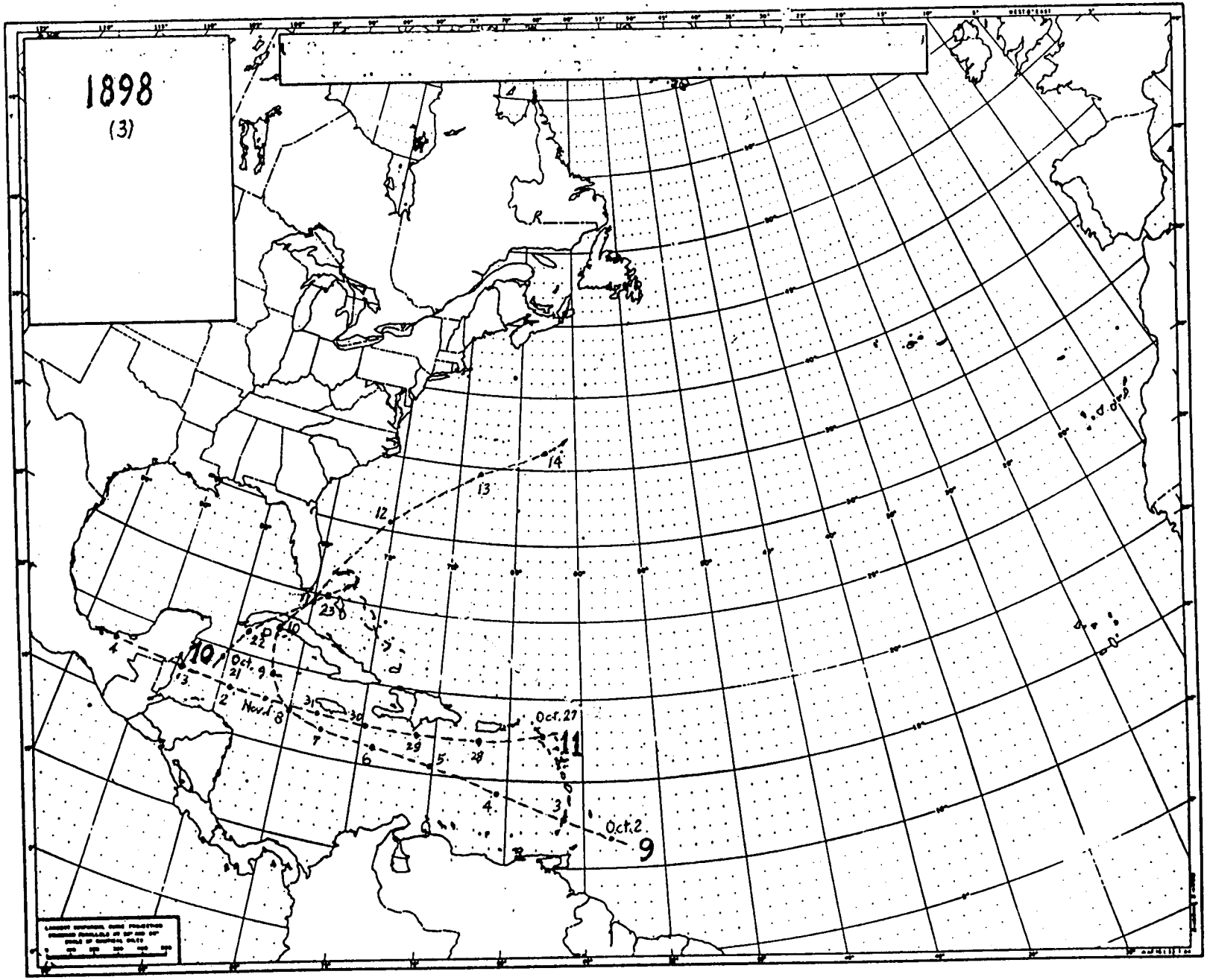

Fig.1 (continued)

storm appears to be developing in the central Gulf: Merida reports a fall in pressure of 0.15 inch in 24 hours and Key West 0.06 inch. Port Eads reports E. wind of 30 mph (The New York Times, Sept.26, 1898, p.1, col.4). Author's note: This and other weather statements published in this newspaper on subsequent days were probably issued the evening before their publication date. 2) A disturbance appears to be in the central Gulf and has caused an E. wind of 36 mph at Port Eads (The New York Times, Sept.27, 1898, p.1, col.6). 3) The storm in the West Gulf appears to be moving W. and will cause high N.E. wind on the N.W. Gulf coast today (The New York Times, Sept.28, 1898, ,p.1, col.2). 4) The storm in the West Gulf has increased in intensity and has caused a fall of pressure of 0.08 to 0.10 inch from New Orleans to Corpus Christi and a S. wind of 40 mph and a rainfall of 3.32 inches in 12 hours at Port Eads (The New York Times, Sept.29, 1898, p.1, col.5). 5) The storm has remained nearly stationary in the West Gulf and has caused rain in the Gulf States and Middle Mississippi Valley and gales on the coast, Port Eads reporting 36 mph from the S.E. and Pensacola the same velocity from the S.E. (The New York Times, Sept.30, 1898, p.1, col.6). 6) The storm has remained stationary in the West Gulf (The New York Times, Oct.1, 1898,p.1, col.3). 7) Maximum wind velocity at Pensacola was S.E. 39 mph on Sept.30 (Monthly Weather Review, Sept.1898). 8) Storm of Sept 21-28, 1898. Western Caribbean, Yucatan, east Texas coast. Not of much force (Tannehill 1938). 9) Storm of Sept. 27-28. Upper Texas coast. Minor (Dunn and Miller, 1960). 10) A storm was first observed at lat. 11 N., long. 80 W. on Sept. 21 and lasted 7 days; it recurved at lat. 28 N., long. 95 W. and it was last observed at lat. 30 N., long. 94 W. (Mitchell, 1924). Author's note: A track which is also included in Mitchell (1924) was found to be quite similar to the one in Neumann et al. (1993), exception made of the fact that the latter one was started on Sept.20 in lieu of on Sept.21.

Information in the above items was found to support, in general, the track for Storm 6, 1898 which is displayed in Neumann et al. (1993). Therefore, the author of this study reproduced such a track in Fig.1.

The tropical storm status which Neumann et al. (1993) gave to this storm was found to be satisfactory in the light of information contained in item 4) and in items 7) through 9).

Storm 7, 1898 (Sept.25-Oct 6), H.

The following information was found in relation to this storm: 1) The steamship "Philadelphia" arrived yesterday from La Guayra and Ponce. The vessel was about 400 miles N. of Puerto Rico when she ran into a revolving storm during which she labored and floundered around for 36 hours. The "Philadelphia" entered the storm from the S.E. steering N.W. by N. and held her course in the teeth of a gale for 20 hours. The center of the storm was reached

Tuesday afternoon (Sept.27) when the wind dropped to about 20 mph. The glass dropped to 28.84 inches. As soon as the vortex was passed, the wind shifted to S.E. blowing at a rate of 60 mph. In the storm center there was hundreds of birds which had been drawn into the vortex (The New York Times, Oct.4, 1898, p.14, col.5). 2) Reports of Sept.28 indicated the formation of a cyclonic storm near Puerto Rico and during Sept.29, the circulation of the winds and the action of the barometer showed that the disturbance has moved to a position off the northern coast of Santo Domingo. During Sept.30 the center moved N. of W. near the Old Bahama Channel, and by the morning of Oct.1, its influence had extended to the Florida coast. By the evening of Oct.1, the storm center had moved to a position about 150 miles N.E. of Jupiter. During the night of Oct. 1, the storm was deflected to a more westerly course by an intensive area of high barometer which occupied the Atlantic coast districts to the northward of its position and, by the morning of Oct.2, it had acquired hurricane strength when it was central off the coast N.E. of Jacksonville, Fl. (Monthly Weather Review, Oct, 1898). Author's note: The storm locations given for the period Sept. 28-30 appeared to be too far south. 3) A storm has developed off the Atlantic coast of Florida, Jupiter reporting a pressure of 29.02 inches and Key West a W. wind of 24 mph (The New York Times, Oct.2, 1898, p.1, col.6). Author's note: This statement was probably issued in the evening of Oct.1. The pressure reading of 29.02 inches is too low and it seems to be a typographic error. 4) The lowest barometer reading at Havana (Belen College Observatory) in association with the Oct.1-2 cyclone was 754.9 millimeters (29.72 inches) and occurred on Oct.1 (Sarasola, 1928). 5) Some observations taken at Jacksonville, Fl: Oct 2, 4 A.M., barometer 29.60 inches; 7 A.M., barometer 29.48 inches, wind N.W. 20 mph; 8 A.M., barometer 29.39 inches, wind N.W. 20 mph; 9 A.M., barometer 29.35 inches, wind N.W. 19 mph; 10 A.M., barometer 29.22 inches, wind W.N.W. 28 mph; 11 A.M., barometer 29.12 inches, wind W. 40 mph; noon, barometer 29.17 inches, wind W. 24 mph; 1 P.M., barometer 29.23 inches, wind S.W. 15 mph; 2 P.M., barometer 29.31 inches, wind S.W. 13 mph; 6 P.M., barometer 29.60 inches, wind S. 14 mph (Ho, 1989). 6) From a report by A.J. Mitchell, Weather Bureau, Jacksonville, Fl: The barometer fell rapidly during the day and night of Oct.1 and reached a minimum of 29.07 inches at 11 A.M., Oct.2. The maximum wind velocity, 60 mph, occurred about 11:10 A.M., Oct.2. The coast district from Mayport to Fernandina suffered heavily; in fact, Fernandina was nearly destroyed. Great damage was caused on the coast near and south of Everet. On the Georgia coast the wind was from the N.E. and the sea flooded level lands, destroying crops and stock and imperiling lives (Monthly Weather Review, Oct. 1898). Author's note: "Everet" is likely to refer to the town of Everett in Georgia, which is located about 10 miles to the W. of Darien. 7) A dispatch published in The Morning News (Savannah, Ga., Oct.5, 1898) and dated at Fernandina, Fl.,

Oct. 4 stated that the water during the hurricane of Sunday (Oct.2) was never known to be so high in the history of that city. It was 6 and 8 feet deep over some of the docks and a tug lying by the side of a wharf was lifted on it, and setting down smashed it. Every building at quarantine station was completely swept out of existence, and not a vestige of any was reported to remain. The damage and ruin at Amelia Beach was almost as complete (Ho, 1898). Author's note: In addition, a dispatch dated on Savannah, Oct.4 and published in The New York Times, Oct.5, 1898, p.1, col.5, stated that, according to information sent by the "H.M.C. Smith" to The Morning News, two children were drowned and many vessels were high and dry on the Beach of Fernandina, Fl. 8) From a report of H.B. Boyer, Weather Bureau observer, Savannah, Ga.: The most of the damage sustained in the vicinity of Savannah was caused by the backing up of the water caused by the S.E. hurricane winds blowing against the Gulf Stream. At Savannah, the storm winds began at 2:30 A.M. Sept.2 and continued until 11:50 P.M. of the same date, with a maximum velocity of 60 mph from the N.E. at 11:30 A.M. The greatest loss was sustained S. of Savannah and nearer the storm center. Great havoc was caused at Brunswick, where nearly every business house and warehouse in the city was damaged. At noon Oct.2 the principal residence and business thoroughfares were 4 to 8 feet under water. Nearly all docks suffered from lifting; one or two hundred thousand feet of lumber and hundreds of barrels of naval stores were washed away, and five vessels were washed ashore. Campbell island, 12 miles from Darien on the Altamaha River was swept by water and all of the inhabitants (not less than 20 and perhaps 50), except 3, were drowned. At Darien there were 31 persons drowned and one killed. The height of the tidal wave at that place was about 13 feet above mean high water mark, and 18 feet at Sapelo Lighthouse. (Monthly Weather Review, Oct. 1898). Author's note: A dispatch dated at Baxley, Ga., Oct.3, which was published by The Morning News. (Savannah, Oct.4) and reproduced in Ho (1989), added that at Brunswick, the bodies of water coming, respectively, from the point off the quarantine, the back landing opposite St. Simmons and Ogleethorpe Bay across from Turtle River were drawing nearer at 11 A.M. and met at noon, and that then at least twenty blocks of business houses and residences were in 4 to 8 feet of water. 9) A dispatch dated at Blackshear, Ga., Oct.3, and published in The Morning News (Savannah, Oct.4, 1898) stated that Blackshear and vicinity had experienced the previous day (Oct.2) the most terrific storm on record. The wind began blowing in the early morning from a northeasterly direction, gradually gaining in violence, until its greatest velocity was reached between 1 and 2 P.M. From 2 to 3 P.M. there was a lull, and it seems the storm was over, but, singularly enough, shortly after 3 P.M. the wind began blowing again, and this time it came from the S. (Ho, 1989). Author's note: It is obvious that Blackshear, which is roughly 45 miles inland, was in the eye of the storm about 1 hour during the

afternoon of Oct.2. 10) Table of hourly observations taken at Savannah, Ga., showing a minimum pressure reading of 29.47 inches at 2 P.M., the maximum wind velocity having been N.E. 59 mph at noon (Ho, 1989). 11) Charleston, S.C., Oct.2. During the day the wind reached the velocity of 62 mph and the tide rose 2.5 feet above normal (The New York Times, Oct.3, 1898, p.1, col.5.). 12) The storm off the S. Atlantic coast of Florida Saturday night (Oct.1) has moved to the coast of Georgia, increasing markedly in intensity, Jacksonville reporting a barometer reading of 29.08 inches at noon Sunday (Oct.2) and Charleston an east wind of 64 mph. The storm is secondary from a disturbed condition of the Caribbean Sea which first appeared last Thursday (Sept.29) north of Santo Domingo and has been traced since that day by the cordon of stations organized in the West Indies service this summer. Hurricane signals are displayed on the Atlantic coast from Norfolk to Florida and emergency warnings of hurricane winds were sent to the S.E. portion of South Carolina and Georgia (The New York Times, Oct. 3, 1898, p.1, col.5). 13) Savannah, Ga., Oct.2. For 15 hours, from 3 A.M. to 6 P.M. tonight, Savannah has been in the grasp of a West Indian hurricane. During that time the wind blew steadily from 50 to 70 mph (The New York Times, Oct.3, 1898, p.1, col.5). 14) Brunswick, Ga., Oct.3. During the tropical hurricane of Sunday (Oct.2) a tidal wave was driven from the sea and inundated for an average of depth of 5 feet practically every business house and warehouse in this city. The docks were under water 4 feet deep. In the resident section the water was from 2 to 8 feet deep. Five vessels are ashore at Brunswick harbor. The steamers "City of Macon", "City of Augusta" and "Kansas City", from New York, and the "Essex" from Baltimore, arrived (at Brunswick), today and all felt the force of the storm to some extent. The "City of Macon" was at the height of the hurricane; the wind reached a velocity of nearly 100 mph, but the ship weathered it and sustained little damage (The New York Times, Oct.4, 1898, p.1, col.5). 15) Savannah, Ga., Oct.4. Campbell Island, 12 miles from Darien on the Altamaha River is said to be completely swept away and only 3 persons succeeded in getting off. (The New York Times, Oct.5, 1898, p.1, col.5). Author's note: Similar information was given in item 8). 16) Charleston, S.C., Oct.4. The schooner "Sarah E. Palmer", from Charlotte Harbor to Cartalet, N.J. was lost Sunday morning (Oct.2) off Stone Inlet, 7 miles S. of Charleston. The "Palmer" ran into the storm off the Bahamas and sprang a leak when 5 days out. The pumps were kept working, she lost her anchor Saturday night (Oct.1). When she was full of water Sunday morning (Oct.2) the full force of the storm struck her, and her superstructure was washed away. One boat was smashed and the other sunk. The captain and two men floated on a reefing plank, but the captain was washed away three times, finally sinking. Therefore, 2 men survived (The New York Times, Oct.5, 1898, p.1, col.5). Author's note: The storm that the "Palmer" ran into off the Bahamas, was not this one; it should

have been Storm 8, 1898. 17) A dispatch dated at Jesup, Ga., Oct.3 and published in The Morning News (Savannah, Oct.4, 1898) stated that Jesup was visited by a terrific storm which began about 8:30 A.M. Oct.2, and reached its greatest velocity about 3 P.M. and lasted until about 8 P.M. Nothing as severe was ever felt there before in the history of the place. (Ho, 1989). 18) A dispatch dated at Waycross, Ga., Oct.3 and published in The Morning News (Savannah, Oct. 4, 1898) stated that the storm did considerable damage to houses, electric wires, fences and crops in Waycross and vicinity (Ho, 1989). 19) The storm central Sunday night (Oct.2) in Southern Georgia has moved to Tennessee diminishing in intensity (The New York Times, Oct.4, 1898, p.1, col.6). Author's note: This statement was probably issued in the evening of Oct.3. 20) Maximum wind velocities were as follows: Tampa, S.W. 24 mph; Jacksonville, W. 60 mph; Savannah, N.E. 60 mph; Augusta, N.E. 36 mph; Charleston, E. 62 mph; all of the above wind velocities occurred on Oct.2. (Monthly Weather Review, Oct. 1898). 21) Storm of Sept.25-Oct.7, 1898. Atlantic, Carolina coast (Tannehill, 1938).
Author's note: The storm was felt much more severely in Georgia then in the Carolinas. 22) Storm of Oct.2, 1898. Extreme in coastal sections of Carolinas and Georgia, 179 killed in Georgia. Minimal on the N.E. Florida coast, with a few killed (Dunn and Miller, 1960). Author's note: The storm was much more severe on the Georgia coast than along the Carolina coast. Ho (1989), using an equation linking some hydrometeorological parameters, came up with an estimated central pressure of about 27.91 inches when the storm made landfall on the Georgia coast. 23) Track showing the following positions: Sept.29 (evening), lat. 20 N., long. 71 W.; Sept.30 (morning), lat. 20.5 N., long, 72.5 W.; Sept.30 (evening), lat. 21.5 N. long. 75 W.; Oct.1 (morning), lat. 25.5 N. long. 76 W.; Oct.1 (evening), lat. 27.5 N., long. 77 W.; Oct.2 (morning), lat. 30.7 N., long 80 W.; Oct 2 (evening), lat. 31.3 N., long. 82 W.; Oct.3, (morning) lat. 32 N., long. 84.7 W.; Oct.3 (evening), lat. 35 N., long. 86.5 W.; Oct.4 (morning), lat. 36.5 N., long. 86 W.; Oct.4 (evening), lat. 38.7 N. long. 85.5 W.; Oct. 5 (morning), lat. 44.5 N., long. 80 W.; Oct.5 (evening), lat. 48.5 N., long. 67 W. (Monthly Weather Review, Oct. 1898). 24) An Oct.1898 storm appeared at lat. 20 N., long. 70 W., recurved at lat. 35 N., long. 86 W. and disappeared near Newfoundland (Garriott, 1900). 25) A storm was first observed near lat. 17 N. long. 59 W. on Sept.25, 1898 and lasted 12 days; it recurved near lat. 38 N., long. 87 W. and it was last observed near lat. 50 N., long. 45 W. (Mitchell 1924).
Author's note: A track for this storm, which is also included in Mitchell (1924), was found to be very similar to the one in Neumann et al (1993).

The storm track for Storm 7, 1898 in Neumann et al. (1993) could not be checked for the period Sept.25-26 owing to the lack of suitable marine data in the above items. The steamship "Philadelphia" encountered the storm about 400 miles to the N. of

Puerto Rico and passed through the center of the storm in the afternoon of Sept.27 (item 1), allowing one to estimate the storm in the vicinity of lat. 24 N., long. 67.5 W. at that time. Such a position was found to be practically along the track shown in Neumann et al. (1995), but the storm reached there roughly 24 hours earlier than in the above mentioned track. The storm very likely moved in from the southeast but the author of this study believes that there is still a slight possibility that Storm 8, 1898 and Storm 7, 1898 might be just one and that, if this were the case, the author's track for Storm 8, 1898 (Fig.1) would be erroneous over the period Sept.27-28, being the 7 A.M. Sept.27 position significantly farther to the east than in the track mentioned and having the storm to gradually turn to the southeast and south while moving at a fairly fast forward speed until reaching the vicinity of lat. 24 N., long. 67.5 W. in the afternoon of Sept.27. However, no evidence of a materialization of the above possibility was found and, consequently the author of this study decided to accept that the storm was moving in from the southeast direction when the "Philadelphia" met it in the afternoon of Sept.27 (item 1). Some modifications were then implemented along the track for storm 7, 1898 in Neumann et al. (1993). Their 7 A.M. Sept.25 position was kept unchanged, but their 7 A.M. Sept.26 position was adjusted to near 19.7 degrees N., 62.5 degrees in order to obtained a better space-time continuity with the author's 7 A.M. Sept.27 position which was estimated near 22.5 degrees N., 66.0 degrees W. on the basis of information in item 1); this position was about 200 miles to the N.W. of the corresponding one in Neumann et al. (1993). The author's 7 A.M. Sept.28 position was estimated near 25.0 degrees N., 70.0 degrees W. on the basis of information in item 1) and space-time continuity. This position was about 240 miles to the N.W. of the corresponding one in Neumann et al. (1993). The author of this study estimated 7 A.M. positions for the period Sept.29-30 as follows: Sept. 29, near 26.5 degrees N., 72.5 degrees W.; Sept.30, near. 27.5 degrees N., 74.5 degrees W.; these positions suggested some gradual decrease in the storm's forward speed from Sept.28 to Sept.30. The author's 7 A.M. Oct.1 position was estimated near 29.0 degrees N., 77.3 degrees W. on the basis of information for that day contained in item 2); this position was found to be about 125 miles to the W. of the corresponding one in Neumann et al. (1993). The author's 7 A.M. Oct.2 position was based on a careful analysis of information contained in various items, particularly in item 5) and was estimated near 30.5 degrees N., 81.0 degrees W.; this position was slightly to the S.E. of the one shown in Neumann et al. (1993). The author's positions for 7 A.M. Oct.1 and 7 A.M. Oct. 2 showed some increase in the storm's forward speed from Sept. 30 to Oct.3, which probably resulted from the influence of the extensive area of high barometer mentioned in item 2). 7 A.M. positions for the period Oct.3-6 in Neumann et al. (1993) were kept unchanged. The author's track for Storm 7, 1898 is

displayed in Fig.1.

Information contained in a good number of the 25 items above was found to support the hurricane status which Neumann et al. (1993) gave to this storm. Indeed, the storm was a major hurricane as revealed by specific information included in items 8) and 22).

Storm 8, 1898 (Sept.26-28), T. S.

This storm corresponds to Storm 5, 1898 in Neumann et al. (1993).

The following information was found in relation to this storm: 1) On Sept.25 a storm of tropical origin appeared as a feeble disturbance over the eastern part of the Gulf of Mexico. During Sept.26 the storm moved N.E. over the Bahamas, where it developed almost hurricane violence and caused considerable damage on some of the islands of that group. Atlantic coast ports and interests were advised of the progress and character of this storm, which was not, however, severely felt on the United States coasts. Unfortunately, the Nassau (Bahamas) morning report of Sept.26 was not received (by the Weather Bureau in Washington), and warning of the storm's increasing intensity could not be given until the receipt of a special noon report from Nassau (Monthly Weather Review, Sept. 1898). 2) Minimum pressure at Havana (Belen College Observatory) was 755.9 millimeters (29.76 inches) in relation to the Sept.25-26, 1898 cyclone and was recorded on Sept.26 (Sarasola, 1928). 3) A storm appears to be developing in the Atlantic off Florida (The New York Times, Sept.27, 1898, p.1, col.6). Author's note: This statement was probably issued in the evening of Sept.26. 4) Santo Domingo reported a maximum wind of 15 mph from the S. on Sept.24 (Monthly Weather Review, Sept. 1898). Author's note: This relatively weak wind might or might not be related to the storm. 5) Storm of Sept. 20-28, 1898. Puerto Rico, Bahamas (Tannehill, 1938). Author's note: Salivia (1972) does not mention this storm as having affected Puerto Rico. 6) Track for this storm as follows: Sept.25 (evening), lat. 23.5 N., long. 84 W.; Sept.26 (morning), lat. 26 N., long. 79 W.; Sept.26 (evening), lat. 27 N., long. 77 W. (Monthly Weather Review, Sept.1898). 7) Map showing a track for the storm as follows: Sept.25 (evening) lat. 24 N., long. 84 W.. Sept.26 (morning) lat. 25.7 N., long. 79.3 W.; Sept.26 (evening), lat. 27 N., long. 76.7 W. (Garriott, 1900). 8) A storm was first observed at lat. 16 N., long. 60 W. on Sept. 20, 1898 and lasted 8 days; it recurved at lat. 26 N., long. 77 W. and it was last observed at lat. 28 N. long. 74 W. (Mitchell, 1924).
Author's note: A storm track which is also included in Mitchell (1924) was found to be very similar to the one in Neumann et al. (1993).

Most information in the above items was found to disagree with the track in Neumann et al. (1993) prior to Sept. 27 (Storm 5, 1898 in their publication). Based on information in items 1) through 3),

6) and 7), the author of this study estimated a 7 A.M. Sept.26 position near 26.0 degrees N., long.79.0 W. as the first one along his track and, by so doing, he discarded most information in the remaining items, primarily on the basis that there is no record of the storm in Puerto Rico and that there are indications that it moved from the eastern Gulf of Mexico to the Bahamas. This position is about 200 miles to the W.N.W. of the corresponding position in Neumann et al. (1993). The author's 7 A.M. Sept.27 position was based on application of some space-time continuity, using evening positions for Sept.26 in items 6) and 7) and the 7 A.M. Sept.28 position in Neumann et al. (1993) which was kept unchanged; his 7 A.M. Sept.27 position was near 27.7 degrees N., 76.0 degrees W. and was found to be about 80 miles to the N. E. of the corresponding one in Neumann et al. (1993). The author's track for Storm 8, 1898 is displayed in Fig.1.

The tropical storm status which Neumann et al. (1993) attributed to this storm (Storm 5, 1892 in their publication) was kept unchanged. However, according to item 1), the storm developed almost hurricane violence and caused considerable damage on some of the northern Bahamas. Storm 8, 1898 probably weakened very rapidly on Sept.28 as Storm 7, 1898, a hurricane, was located some 300 miles to the E.S.E. However, the author of this study believes that there is a slight possibility that Storm 8, 1898 and Storm 7, 1898 be the same, and if this were the case, the 7 A.M. positions along the author's track for Storm 7, 1898 for Sept, 27-28 would be in error, being significantly to the west of the real ones, and the storm would have started a loop motion to the S.E. and S. at a fairly fast rate reaching the area about 400 miles N. of Puerto Rico by the afternoon of Sept.27, when a ship went through the center of Storm 7, 1898 as discussed in the author's study of this latter storm.

Storm 9, 1898 (Oct.2-14), T. S.

This storm corresponds to Storm 8, 1898 in Neumann et al. (1993).

The following information was found in relation to this storm: 1) Oct.8-11, 1898. A cyclonic perturbation was felt in Cuba from Santiago de Cuba to Havana. Its moderate winds and torrential rains affected more intensively the provinces of Camaguey and Santa Clara when the center was N. of this province. The "Colon" felt the tempest with the intensity of a true cyclone a short distance from Cuba. (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza which is included in Sarasola (1928). 2) Rainstorm in Las Villas (Santa Clara) in Oct. 1898 (Martinez-Fortun, 1942). 3) Minimum pressure at Havana (Belen College Observatory) during the cyclone of Oct.10-11, 1898 was 754.5 millimeters (29.71 inches) and occurred on Oct.10 (Sarasola, 1928). 4) A storm which as yet shows but moderate

strength is central E. of Key West from which position it will probably move northward attended by high N.E. winds south of Jacksonville today (The New York Times, Oct. 10, 1898, p.1, col.4). Author's note: This and subsequent weather statements in The New York Times were probably issued the evening before their publication date. The position to the E. of Key West given in this item is probably in error. 5) The storm which was reported off the extreme southern coast of Florida Sunday (Oct.9) is now apparently central S. of Key West. The barometer has fallen in that region and the indications are that the center of the storm will move slowly northward causing high N.E. winds on the Florida coast. The display of signals for N.E. gales has been continued at all the Florida peninsula ports. (The New York Times, Oct. 11, 1898, p.1, col.6). 6) The South Atlantic storm has moved N.E. between the Bahamas and the Florida coast without evidence of marked strength (The New York Times, Oct.12, 1898, p.1, col.6). 7) The South Atlantic storm has moved eastward beyond the region of observation (The New York Times, Oct.13, 1898, p.1, col.5). 8) Havana, Oct.18, 1898. The latest advices received here from Trinidad in the province of Santa Clara say that great damage has been caused there by the recent storm. A great many houses were swept entirely away. Eight people are known to have been killed and many cattle drowned. (Tampa Morning Tribune, Oct.19, 1898, p.1, col.3). Author's note: Trinidad is located near the southern coast of central Cuba. 9) A heavy rain was experienced in this section Sunday and Monday (Oct.9-10). It looked as though the long delayed wet season had set in at last. But this seems not to be the case. (The Miami Metropolis, Oct.14, 1898, p.1, col.3). 10) Eugene DeBogory and his sister were sailing down from Lemon City a few days since when they were struck by a sudden squall and their boat capsized in 12 feet of water. (The Miami Metropolis, Oct.14, 1898, p.7, col.2). Author's note: Lemon City was located a few miles N. of Miami, and Mr. and Miss DeBogory were rescued by two men. 11) Storm of Oct.10-26, 1898. Caribbean Sea, western Cuba, Florida (Tannehill, 1938). 12) A storm track as follows: Oct.10 (morning), lat. 22 N., long. 83.5 W.; Oct.10 (evening), lat. 23 N., long. 82 W.; Oct.11 (morning), lat. 24.7, long. 79.7 W.; Oct.11 (evening), lat. 27 N. long. 75.5 W. (Monthly Weather Review, Oct. 1898). 13) A storm was first observed near lat. 12 N., long. 59 W. on Oct.2, 1898 and lasted for 21 days; it recurved near lat. 24 N., long 84 W. and it was last observed near lat. 69 N., long. 5 W. (Mitchell, 1924). Author's note: A track for this storm which is also shown in Mitchell (1924) and the corresponding one in Neumann et al. (1993) as for Storm 8, 1898 were found to be very similar, from their beginning to the region N.E. of Bermuda.

On the basis of information in the above items, some modifications were introduced along the track for this storm in Neumann et al. (1993), which is denoted as for Storm 8, 1898 in their publication. Their track over the eastern and central

Caribbean prior to Oct.7 could not be verified by the author of this study owing to the lack of suitable data in the above items. In fact, the author shows some skepticism about the existence of the storm as such that far to the east, but finally decided to accept that portion of the track. The 7 A.M. Oct.7 position in Neumann et al. (1993) was adjusted to the E.S.E. by about 70 miles to near 16.7 degrees N., 77.7 degrees W., in order to fit a better space-time continuity with a portion of the track prepared by the author of this study starting on Oct.8. A careful analysis of the information contained in items 1) thorough 6) and 11) and 12) allowed the author to estimate 7 A.M. positions for the period Oct.8-11 as follows: Oct.8, near 18.3 degrees N., 80.0 degrees W.; Oct.9 near 20.3 degrees N. 81.7 degrees W.; Oct.10, near 22.3 degrees N., 82.0 degrees W.; Oct.11, near 24.5 degrees N., 80.0 W. These positions were about 120 miles towards the east of the respective ones in Neumann et al. (1993), except for Oct.11 when the author's location was over 200 miles to the south of the one in the above mentioned publication. The 7 A.M. Oct.12 position in Neumann et al. (1993) was adjusted to the S.S.W. by about 100 miles to near 30.5 degrees N., 75.3 degrees W. in order to keep a better space-time continuity with the 7 A.M. positions for Oct.13-14 in Neumann et al. (1993) which were kept unchanged. The author's track for Storm 9, 1898 is displayed in Fig.1.

In spite of the fact that the "Colon" felt the storm with the intensity of a true cyclone (item 1) suggests the likelihood of hurricane winds, the tropical storm status given to this storm by Neumann et al. (1993) as for Storm 8, 1898, was retained by the author of this study.

Storm 10, 1898 (Oct. 21-23), T. S.

This is a new case which has been recently documented by the author of this study and which, of course, is not included in Neumann et al. (1993). Strictly speaking, however, the case is not a new one since it is included in Sarasola (1928).

Documentation of this case was based on the following information: 1) Oct.21-23, 1898. A cyclonic perturbation affected Cuba from Santa Clara to Pinar del Rio. It caused flooding. Some boats were sunk in Havana harbor and the schooner "Kate" was wrecked on the northern coast of Pinar del Rio. The "Kate" had sailed from Key West and had on board a shipment destined to the forces of General Jose Miguel Gomez at Sancti Spiritus (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M.Gutierrez-Lanza which is included in Sarasola (1928). 2) Havana, Oct.23. The rain storm of yesterday morning subsided towards evening and today the weather is cool and crisp. The northerly winds bring great relief and it is felt that the end of the fever season in Havana has been reached. (The New York Times, Oct.24, p.4, cols. 1 and 2). 3) Havana, Oct.27. Red Cross schooner

"Kate" which left Key West on Oct.19 with a cargo of stores and medical supplies from the Red Cross Society for the Cuban forces of Gen. Jose Miguel Gomez at Sancti Spiritus was wrecked Oct.22 on San Carlos reefs, Province of Pinar del Rio. The crew was saved but the cargo was lost (The New York Times, Oct.28, 1898, p.4, col.4). 4) Havana, Oct.28. The Star and Stripes floating of late over the Hotel Trocha having become somewhat damaged by the rough weather, a number of young Cuban ladies called upon Major. Gen. Butler this afternoon and asked permission to repair it. Gen. Butler readily consented, had the flag hauled down and handed it to the young ladies, who triumphantly bore it away to be mended (The New York Times, Oct.29, 1898, p.4, col.3). 5) Maximum wind at Key West was N. 31 mph and occurred on Oct.22 (Monthly Weather Review, Oct. 1898). 6) The southwestern storm was divided, one part being central this evening off the Middle Gulf coast and the other over eastern Lake Michigan. High southeasterly shifting to northwesterly winds will prevail in the eastern lake region and the winds on the South Atlantic coast and over the east Gulf are likely to become dangerously high from E. and N.E. (The New York Times, Oct.21, 1898, p.1, col.6). Author's note: This statement was issued during the evening before its publication date. 7) During today, the storm will move eastward attended by rain in New England and by rain, followed by clearing and much cooler weather in the Middle and South Atlantic States (The New York Times, Oct.22, 1898, p.1, col.6). 8) The temperature continues low in the Middle and South Atlantic States where it ranges 10 to 20 degrees (Farenheit) below the average for the season. Heavy frost occurred yesterday morning throughout Alabama and eastern and northern Mississippi and light frost was reported on Southwestern Mississippi and Lousiana as far south as New Orleans (The New York Times, Oct.23, 1898, p.1, col.6).

Based on a careful analysis of information in items 1) through 3) and item 5) and after having also taken into account the information in items 6) through 8), the author of this study prepared an approximate track for Storm 10, 1898. Estimated 7 A.M. positions along the author's track were as follows: Oct.21, near 19.5 degrees N., 85.3 degrees W.; Oct.22, near 21.5 degrees N., 84.0 degrees W.; Oct.23, near 25.0 degrees N., 79.0 degrees W. The track for this storm is displayed in Fig.1.

The author of this study believes that Storm 10, 1898 was a rather weak tropical storm which moved to the northeast ahead of a cold front which moved over the eastern Gulf of Mexico on Oct.21-22 as inferred from information in items 6) through 8). Weather information from Havana in item 2) showed that the front has passed that city by Oct.23, suggesting that the storm had become by then a disturbance embedded in the frontal boundary. Therefore, the storm should have rapidly lost its tropical characteristics on that date.

Storm 11, 1898 (Oct.27-Nov.4), T. S.

This storm corresponds to Storm 9, 1898 in Neumann et al. (1993).

Very little information was found about this storm: 1) Storm of Oct.26-Nov.9, 1898. Caribbean Sea, Yucatan (Tannehill, 1938). Author's note: The ending date of Nov.9 appears to be in error. 2) A storm was first observed at lat.17 N., long. 63 W. on Oct.27, 1898 and lasted 7 days; it was last observed at lat.17 N., long. 93 W. (Mitchell, 1924). Author's note: A track which is also included in Mitchell (1924) was found to be very similar to that for Storm 9, 1898 in Neumann et al. (1993).

In spite of that the author of this study showed lots of skepticism regarding the existence and evolution of this storm, he decided to accept the track shown in Neumann et al. (1898) as for Storm 9, 1898 and to reproduce it in Fig.1 as for Storm 11, 1898.

The author also decided to keep unchanged the tropical storm status given in Neumann et al. (1993).

Special statement.

In addition to the storm cases which were fully discussed above, two other possible cases were found for 1898. The available information for these cases was found to be insufficient to determine the true nature of the disturbances and/or to verify their tracks.

A) Case of Sept.9-11, 1898.

The following information was found about this possible case: 1) During Sept.9-11 a storm center moved from the central part of the Gulf of Mexico northwestward to the Louisiana coast, attended by heavy rain and high N.E. winds along the Middle Gulf coast. During Sept.12 this storm passed rapidly northward and by the morning of Sept.13 joined a low pressure area over eastern Nebraska (Monthly Weather Review, Sept., 1898). 2) Pressure is high, except for a slight depression in the West Gulf. The storm in the Gulf has moved slightly towards the W. (The New York Times, Sept.11, 1898, p.1, col.6). 3) The storm of very slight intensity in the West Gulf has moved to eastern Texas (The New York Times, Sept.13, 1898, p.1,

col.6). 4) Track for this possible case showing morning positions as follows: Sept.9, lat. 27 N., long. 88.5 W.; Sept.10, lat. 27.5 N., long. 91.3 W.; Sept.11, lat. 28.7 N., long. 93 W.; Sept.12, lat. 30.5 N., long. 93.7 W. (Monthly Weather Review, Sept, 1898). The word storm was used in connection with this case in item 1); however, no gales were mentioned in that item and the terms "slight depression" and "storm of very slight intensity" were used in items 2) and 3), respectively. Therefore, it is quite doubtful that this weather system had attained tropical storm intensity, and this is why the author of this study decided to keep this system as a possible case.

B) Case of Nov. 5-7, 1898.

The following information was found about this possible case: 1) Special reports received yesterday afternoon indicated the presence near Trinidad of a cyclonic storm moving northwestward. Warning of the location, character and probable force of the storm was cabled to the Weather Bureau Stations in the Lesser Antilles, Trinidad, Puerto Rico, Santiago (de Cuba), Santo Domingo and Colon. Advices were also cabled to Admiral Watson, U.S. Navy, Caimanera and to the commanding officer of the U.S.Army at Ponce (The New York Times, Nov.6, 1898, p.1, col.6). 2) Yesterday's reports indicate that the storm has moved northward and is central in the vicinity of St. Kitts. (The New York Times, Nov.7, 1898, p.1, col.5). 3) A small disturbance was reported near Trinidad on Nov.6, but it apparently disappeared by the morning of Nov.7 (Monthly Weather Review, Nov. 1898). Information in the above items was not found to be sufficient to establish that this weather system attained tropical storm intensity. In fact, the term "small disturbance" used in item 2) practically disproved such intensity and, therefore, the author of this study decided to keep this one as a possible case.